The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Post-War Reconstruction

THE attention that is being paid in published pronouncements to post-war reconstruction is a measure of the lively remembrance which those engaged in industry have of the events that followed the last war. The President of the Institution of Chemical Engineers devoted his Presidential Address to this subject and dealt with its implications as regards the chemical industry in a masterly manner. We have to face a good deal of material reconstruction because both in Britain and Germany the ravages of war have already been incurred to an extent not previously known in the history of either country; and we do not doubt that both countries will yet have to face a good deal more such damage before the present struggle is ended. It is not, however, with reconstruction in that sense that the Institution of Chemical Engineers and the chemical industry in general are particularly concerned. It is with the reorganisation of trade and industry, with the method by which we should deal with the financial morass left by the sinking of capital in powder and shot, and with clearing the channels of international trade from the weeds which have encumbered them before and during the war, so that general prosperity and sanity may again return to the whole world. It was rightly maintained by a speaker at the annual luncheon that men *will* be free, but they must also be fed and contented if future wars are to be avoided.

That brings us to a conflict between two schools of thought. There is a school, of which Mr. Heron Rogers is evidently a supporter, which maintains that after the war this nation will be impoverished and must become economically as nearly self-supporting as is possible. We must, he says, make our own oil from coal in order to avoid importing oil. We must make our own dextrin, alcohols, and breakfast foods; we must grow our own timber as far as possible; and in general we must reduce imports to vanishing-point by developing our own resources. This is the commonsense way in which an industrialist of the pre-war school would run his business.

There is another school of thought which suggests that free-flowing international trade should be our object on the conclusion of this war. We do not here say which of these two schools of thought we believe to be correct or whether indeed either of them is wholly correct; but we suggest that this is a matter for careful reflection on the part of the leaders of industry, of the Governments of the world, and of all who take an intelligent interest in the organisation of commerce.

The foolishness of placing the excess profits duty at 100 per cent. has been pointed out in these columns and by many leaders of industry within recent weeks. It is now well recognised that an excess profits tax at this figure must handicap reconstruction after the war because there would be no capital left with which to reconstruct. It has already handicapped our present war effort because there was no incentive to efficiency and sound business methods. It is curious that the Select Committees who have reported on national expenditure have blamed the cost-percentage system and other similar devices for placing orders quickly without obtaining definite prices as being the cause of vast unnecessary expenditure, but have not yet laid their hands upon one of the biggest contributors to this wastage—the 100 per cent. excess profits tax. Chemical plant is more subject to wear and tear and obsolescence than any other. The rapid progress of research and development accounts for the high obsolescence rate. It is, indeed, fortunate that the Chancellor has mitigated the difficulty in the latest budget.

The chemical industry is specially concerned with the problem of post-war reconstruction because after the war we shall have two problems. The first of these will be to put back our factories to their normal processes and products and in doing so to embody the latest advances in technique, so that we may compete once again in the markets of the world on equal terms with our competitors. Our second problem is that new chemical manufactures must be undertaken in order to find work both for our population and for the increasing number of scientifically trained men that will be available. We must consider what we propose to do with our war factories because one of our chief problems after the war will be to re-settle industry. This is a matter that must be taken in hand now and there are enough technically trained men who are not so fully immersed in our war effort that they could not be spared to examine these urgent problems.

The chemical industry has before it, as Mr. Rogers pointed out, a great opportunity for expansion after the war. We have unlimited coal, limestone, and other natural products; we have plenty of first-class soil for agriculture, and, if we would but use it, we have more water power than many people believe. There is, as he explained, a vast number of useful products that can be manufactured in this country and if the chemical industry grasps its opportunities, always provided that the Government allows it to grasp them, this war may see as great a fillip to the chemical industry as did the last.

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NOTES AND COMMENTS

Branded Goods and Goodwill

MR. OLIVER LYTTELTON, President of the Board of Trade, speaking in the House of Commons recently, said that most people desired to keep their brands and trade marks in front of the public, and in many instances where industries were engaged in Government work manufacturers were keeping their brands in front of the public by means of advertisements. The Government would give all the help they could to keeping these trade marks alive. Commenting on this, in a letter to *The Times*, Mr. Norman Moore, President of the Institute of Incorporated Practitioners in Advertising, affirms that British brand names and trade marks are very valuable commercial assets. Some of them have been built up by long years of good trading, by careful maintenance of quality standards, and by substantial investment in advertising. In the aggregate these brand names represent many millions of pounds of shareholders' capital. During the temporary eclipse of his normal production activities the wise manufacturer, he says, can and should protect his brand names by means of advertising. It is perfectly possible to keep brand names before the public at reasonable cost by a moderate but consistent advertising policy. When the war is over those manufacturers who have kept their brand names alive in the public consciousness will be in the most advantageous position to resume their normal trading and to re-employ the young men and women now temporarily absorbed in war service.

German Control of U.S. Chemicals

SEVERAL correspondents have reported from America that investigations are being made by the Department of Justice into allegations that the German Dye Trust is attempting to gain control of the United States chemical industry. Efforts, it is stated, are being made to build up dollar credits and retain control of markets, notably the South American market, through patent agreements with affiliated American concerns. It is alleged that the Trust has been dominating the American chemical trade by means of patent-assigning arrangements that were entered into through various Swiss and American interests since the war started. About 400 patents, it is said, were assigned to one American interest. It is further alleged that many products of American labour, made under German patents, are required to be packed exactly as the German-made products were packed, and with the German trade-marks retained. According to the Department of Justice, a large part of the funds derived from South America by these practices has been spent on German Government propaganda. The Department of Justice has subpœnaed the documents of seven corporations in New York and New Jersey, and are requiring these corporations to disclose any connection they may have with any of 100 named firms which do business in Latin America. The corporations under subpœna are the Schering Corporation and Ciba and Hoffman La Roche companies in New Jersey, and the Swiss Bank Corporation, the General Aniline and Film Corporation, the Sterling Products Company, and the Winthrop Chemical Company in New York. Some of these companies have issued statements disavowing any connection with the activities of the Dye Trust. According to well-informed sources, the Schering Corporation was owned by the Schering A.-G. of Germany until 1937, when it passed to the foreign bank. An intricate structure was then built up in an attempt to conceal German control and ownership, it is stated.

Banting's Last Mission

SIR FREDERICK BANTING, the renowned discoverer of insulin, has until the present time been mainly associated with therapeutic chemistry. To what extent he was proposing to devote himself to another branch of chemistry when his death occurred, and whether he was on the point of earning even greater gratitude from the men and women and the children of the whole world, only time will tell. But some interesting information comes to light in a report quoted by the *Yorkshire Post*. The fatal journey he undertook is known to have been the start of an important mission, the full story of which cannot be told until after the war. Government circles in Ottawa understood that Sir Frederick had found a way virtually to nullify any use of poison gas by the Germans and that he was speeding to this country to outline the method. It is assumed that his formula was known to others, and was not lost with his death.

Bombs on Bremen

MANNHEIM, vital to Germany as a commercial and industrial centre, is noteworthy for its concentration of chemical works and some account of the winter activities of the R.A.F. against its chemical industry was recently given in our columns. News from the Ministry of Economic Warfare now comes to hand concerning the December and January raids on Bremen. This famous seaport, though mainly associated with shipbuilding, presents several attractive chemical targets for our bombers. The old town is situated on the banks of the river Weser some miles from its mouth, and further downstream on the same bank is the suburb of Oslebshausen. Here are the coke ovens and blast furnaces of the Norddeutsche Hütte A.G. and the plant of the Deutsche Vacuum Oel A.G., specialising in the production of lubricating oils, most of the factories being grouped round the docks, which have been heavily bombed. Between this and the old town lies a group of seed-crushing mills, in the Holz-und-Fabrikhafen area, few of which have escaped damage. In the Neustadt district, on the other bank of the Weser, are the factories of the Francke Werke which normally produce tanks and other apparatus for gasworks, chemical plants, oil refineries, etc. These, too, along with other works in the same area, suffered considerable damage in December and January, when the neighbouring Technical Schools, in the Kleine Allee, were burnt out.

Effects of the British Blockade

INFORMATION made available by the Ministry of Economic Warfare shows that the Nazis' highly organised economy is stretched at many points by the blockade, both directly and indirectly. The need to maintain synthetic and substitute industries, and to grow food instead of importing it, is a strain on labour and transport. The need to supply German soldiers in occupied countries, and to keep Italy's industries going, is a further strain. Thus, the organisation of supplies from and through Russia is increasingly necessary. Details of shortage in various directions may be summarised as follows: oil, supply position difficult; rubber, severe restrictions; ferro-alloys, non-ferrous metals, textiles, serious. Leather, packing materials, food, transport, and labour are also in short supply. It is noteworthy that 50,000 more Italians, including many metal workers, have recently gone to Germany.

POTTERY IN WAR TIME

Stoneware as a Chemical Engineering Material

by DESMOND EYLES

THE war has given a decided impetus to the use of pottery—in the form of acid-proof chemical stoneware—as an engineering material, not only in the chemical industries, but also in many allied industries. Stoneware is being used to-day by food manufacturers, paper mills, textile mills, and makers of soaps, perfumes, cosmetics, dyestuffs, etc., to replace metal and other materials that are more urgently required for the war effort. It must be emphasised that this tendency to use chemical stoneware to replace metals had been in evidence in many of these industries long before the war, especially where the problem of corrosion was acute. Stoneware is essentially *not* a "substitute" material, but one that has attained its present position in the chemical engineering field solely on its own merits.

The acid-resisting qualities of stoneware have been known and appreciated for centuries. Among the materials available for use on an industrial scale it is one of the few that will resist the attacks of all acids (with the single exception of hydrofluoric acid) in all concentrations. It is also proof against nearly all other corrosive chemicals, except concentrated solutions of caustic alkalies. On the other hand, most of the metals and other plant materials are subject to numerous restrictions as to the type and concentration of acid with which they may be used.

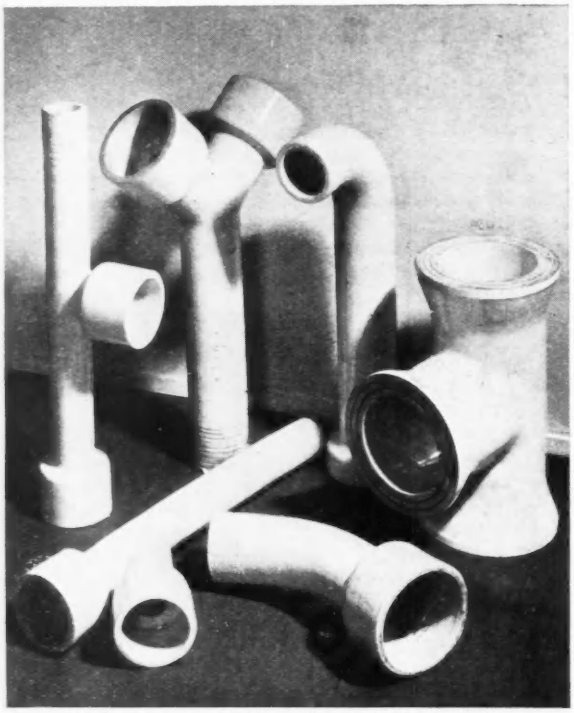
Perhaps one of the most striking facts about modern chemical stoneware—and one that it not always sufficiently stressed—is that in recent years its compression strength has been so increased that it is now equal to that of grey cast iron. Tensile strength, bending resistance, and impact strength have likewise been improved and it is even possible to work stoneware with a chisel or to grind it to exact measurements. In the past, stoneware has been at a disadvantage for certain special processes owing to its limited resistance to sudden changes of temperature. Thanks to the research of British ceramists and chemists, a stoneware body is now available which largely overcomes this difficulty, subject to the observance of certain simple precautions.

The other outstanding quality of stoneware is the flexibility of design which it allows. Stoneware apparatus of any design or size, up to a capacity of several hundred gallons, can be made to suit the specifications of a client, who may require only one or two units. There may be an extra charge for special plaster moulds, but even so the cost will be far less than for a similar special unit in metal. The British stoneware industry is willing to co-operate with all other industries in which new uses for stoneware might be found and to design plant to meet specific needs. Great progress has been made in fitting and assembling mechanical equipment, such as pumps and fans, in which all parts liable to chemical attack are made of stoneware, ground to fine limits and highly polished. The body of stoneware is just as acid proof as the glaze; and the fact that it is not necessary to rely on the latter for protection makes it possible to grind the material to any desired dimensions. It is possible to obtain vessels in one piece up to several hundred gallons capacity, and where still larger units are required, stoneware tiles or blocks for lining concrete, metal, or brick vessels, are being more and more utilised. These tiles are usually fixed in two layers—those in the lower layer unglazed and roughened on both surfaces, while the outer tiles are glazed on the exposed face and roughened on the back. This method ensures a good key for the jointing material.

An interesting development of the last few years has been the greatly increased use of chemical stoneware for pipe-lines. Pipes are the arteries and veins of a chemical plant and when processing is in progress the risk of a breakdown must be reduced to a minimum. Corrosion and slime-formation are the most frequent causes of trouble, and it has been proved conclusively that where stoneware pipe-lines are installed,

A large vessel of chemical stoneware going into the kiln for firing. The firing temperature reaches 1250°C. or more

New type of chemical stoneware vacuum filter, incorporating a porous ceramic plate with integral surround



Chemical stoneware pipes, showing the two types in general use: (a) with ordinary sockets and spigots; (b) with conical flanges

these difficulties are eliminated. The pipes are specially designed with conical flanges joined together by special couplings. Should a replacement or alteration become necessary, it is a simple matter to disconnect the couplings and substitute a new section. Stoneware pipe-lines are the easiest of all to keep clean and their use eliminates periodical painting, with its attendant expense.

Stoneware for Filters

Among the many other uses of chemical stoneware, the following may be mentioned: cooling and washing towers, absorption and reaction towers for the production and development of acids; condenser jars, receivers, and coils; injectors, elevators, emulsifiers, acid eggs, exhausters, and pumps. Hollow vessels, such as pans, vats, tanks, jars, and bottles, are used in tens of thousands, fitted where necessary with stoneware acid cocks. Another very important use of stoneware is for pressure and vacuum filters. Filtration is one of the most widespread processes in the chemical industries, and stoneware filters, because of their resistance to corrosion, and the ease with which they may be cleaned, are largely used. The latest type embodies a porous ceramic filtering plate which it is claimed is much more satisfactory than the usual cloth or paper membranes.

Until a few years ago, Germany was probably the world's largest user of chemical stoneware. There was a certain conservatism on the part of British industrial chemists which made them inclined to use this most valuable material only where there was no other alternative. To-day, it is significant to note that the tendency is no longer to ask: "*Must* we use chemical stoneware?" but rather "*Can* we use chemical stoneware?" Any questions that may have lingered in certain engineers' minds about the practicability of using stoneware have been answered in the best of all ways: by the fact that stoneware plant installed five, ten, or twenty years ago is still giving trouble-free service. Unlike many other manufacturers of chemical equipment, the stoneware maker relies not at all on replacements for future business, but rather on the extension of the uses of the material. And there can be no doubt at all that the war is going to accelerate this extension.

Quinine, Natural and Synthetic

Some Notes on American Progress

IMPORTS of cinchona bark, quinine sulphate and other derivatives into the U.S.A. during 1940 were greatly in excess of those for 1939 and previous years, owing to a desire to have ample supplies on hand to provide against any possible contingencies during the next few years. Imports of cinchona bark and other bark from which quinine may be extracted thus rose from 2,029,648 lb., valued at $856,606 in 1939 to 5,418,271 lb., valued at $2,290,610, in 1940, and imports of quinine sulphate from 1,386,016 oz., valued at $739,866, to 2,464,304 oz., valued at $1,329,862. Imports of other quinine and alkaloids and salts from cinchona bark, however, dropped from 2,318,712 oz., valued at $651,677 to 1,024,816 oz., valued at $498,500. The first arrivals of belladonna since June, 1940, entered the United States in December, amounting to 5223 lb., valued at $1138, of which Spain supplied 1102 lb., valued at $420 and Yugoslavia 4123 lb., valued at $718.

Studies of quinine production at the agricultural experimental station in Puerto Rico have reached the stage where the station has mature trees and is able to harvest and assay samples of bark. This bark, from the trees of *Cinchona ledgeriana,* has yielded 8.5 per cent. of quinine as the sulphate, which may be considered a good commercial yield. The experimental station has made good progress in studying the soil requirements, conditions for propagation of the trees on a large scale, and the protection of the crop from insect pests and diseases. It has also standardised a method for obtaining a good nursery of trees. "The expansion of the plantings in Puerto Rico is now possible," stated Dr. James T. Jardine, director of the Office of Experiment Stations recently.

Dr. James R. Bailey, of the University of Texas, Austin, Tex., well known during the last war for having "cracked" the German formulæ for novocain and synthetic adrenalin, has announced a potential source from petroleum of pharmaceutical intermediaries similar to quinine and cocaine. This source is a refining by-product obtained without interference with refinery routine. The compounds are known as benzoquinolines and border on the field of the carcinogentic compounds. They consist of white crystals resembling sugar. According to Dr. Bailey, his investigation has covered only between 5 and 20 per cent. of the fractional bases supplied him by leading refineries. This has led him to believe that he has scarcely disturbed the surface of the nitrogen compounds recoverable from crude oil. So far, Dr. Bailey has recovered thirty-two compounds from petroleum by-products.

A CHEMIST'S BOOKSHELF

THE SAMPLING AND CHEMICAL ANALYSIS OF CAST FERROUS METALS. By E. Taylor Austin, F.I.C. Birmingham: B.C.I.R.A. Pp. 140. Price to non-members of the B.C.I.R.A., 15s.

Standardisation of methods of analysis is the main objective of this Special Publication No. 7 of the British Cast Iron Research Association. The report has been revised and enlarged by Mr. Taylor Austin, Chief Chemist to the Association, and is primarily intended for those requiring to make chemical analyses of pig irons, cast iron, and ferro-alloys. Special attention is paid to the presence of graphitic carbon in grey iron, which often leads to complications not encountered in the examination of steel samples. The three parts into which the report is divided deal respectively with (i) pig iron, plain cast iron, and malleable cast iron; (ii) alloy cast iron; and (iii) ferro-alloys. The procedures are most carefully detailed, and the diagrams of apparatus required will be found particularly helpful. A silicon determination method for ferro-alloys, not hitherto published, is an interesting inclusion.

Notes from Works Safety Jottings

Commonplace Precautions

by JOHN CREEVEY

SAFETY, regarded in its true perspective, is little more individual than collective. Each member of the works staff is really as much responsible for the safety of others as for his own. But it is not just a matter of being cautious and conscientious. There are certain things which all must know in order that hazards can be reduced to the minimum, if not entirely eliminated. Certain rules, observed and respected, will obviate accidents; other rules can reduce the consequences to less disastrous dimensions should an accident occur. It is sometimes said that all accidents are avoidable. But that is not exactly true, unless it is possible to go to the very beginning where the trouble originates. Sometimes that beginning may not be under the control of the works personnel. Someone outside may have to share the blame; thus absolute freedom from accidents cannot be assured unless there is co-operation between one works and another, and likewise between workers in one sphere of industry and another.

* * *

At any chemical works there are general as well as specific safety measures that must be observed. Some things are so generally obvious that it might sound ridiculous to mention them. Yet the consequences attending certain accidents have proved that there might well have been greater general knowledge of elementary precautions. The audience at the theatre or cinema is expected to know the whereabouts of emergency exits, from notices placed in prominent positions; the way out of the building should be easy and as well known to them as the way out of their own homes. So, too, each person employed at a works should be conversant with "the way about the works," especially when the buildings are extensive. It should be the duty of someone to see that a person newly employed knows this before he leaves at the end of his first working day. Exits from buildings, traffic crossings, the presence of overhead hoists and runways, and passages leading to any existent dead ends or cul-de-sacs, must be pointed out to all, emphasis being varied to meet the intelligence of the individual. It is not ridiculous to assume that new employees are devoid of all intelligence; it is a matter of wise insurance against commonplace accidents and panic to do what has been suggested. More than one new employee has been trapped as a result of being unfamiliar with the layout of the works, when an emergency has occurred during his first week.

* * *

The exact position and method of using fire blankets and emergency fire-fighting appliances should be brought to the notice of all employees. Similarly, there should be knowledge of the position and method of making full use of any emergency showers that have been installed. New employees should be shown over the first-aid room, and properly impressed with the importance of reporting promptly for treatment, following any injury, whatever the cause. They should be made familiar with the presence of any first-aid boxes or posts in their particular part of the works, and also know the person who is authorised to take charge of an accident case from the moment it can be reported. Fire alarms, if installed, should be pointed out, the mode of giving alarm explained, as well as the circumstances which necessitate an alarm being raised. It is better to have an alarm sounded for some trivial occurrence, than to suffer the ill consequences of hesitancy. A false alarm gives useful exercise to those responsible for manning fire action stations, as well as an opportunity to observe the reaction of other personnel who, with no particular emergency duty, remain calm and act in accordance with instructions from the person in charge at that particular part of the works.

In view of certain recognised dangers a chemical worker should receive instructions in first aid as soon as possible, both from the general physical aspect as well as from the chemical aspect. Efficiency in first aid should be reviewed at least every two years, and encouragement should be given to keep the standard high.

* * *

Such protective equipment as goggles, rubber gloves and aprons, gas masks and fire blankets must be kept in a recognised place in each part of the works where there is likely to be need of them, either as a matter of routine or in an emergency; if for the latter service, they must be inspected by a responsible person at regular intervals. When there has been cause to use them the fact should be brought to the notice of this person, who must assure himself that usage has not resulted in any damage or loss of efficiency. Serious loss of efficiency may take place in gas-mask canisters, which should be replaced by new ones from the store after use, and at least once a year if not called upon. The adhesive seal should otherwise be retained at the bottom of the canister until needed for use; then it must not be forgotten to strip the seal off, as more than one fatality has occurred through failure to do this.

* * *

It is a sacred rule for general safety that no exit or passage in any building be blocked, even momentarily. A truck which has broken down when moving a load should be dealt with without delay, the necessary assistance being summoned immediately, and warning of a breakdown in the line of possible traffic passed to the person in charge of the department or section of the works where the breakdown has taken place. Materials which it would be dangerous to leave in that part of the works should be transferred to another truck and moved away without merely unloading to the floor for removal "as soon as convenient" upon another truck. There should always be a spare truck available, to be used only in an emergency. The same remarks apply to a spare ladder, a tall pair of steps, hoisting tackle, all of which should be kept at some central station from which they can be summoned immediately to any other part of the works.

* * *

The installation of inter-departmental telephones throughout the works, irrespective of the size of the latter, can do good service in meeting emergencies. First-aid room, fire station, emergency stores, administrative offices, garage, check-house at the main gate, and key personnel should all be in immediate touch at the turn of a dial and the pressing of a button. Instructions to attend to the ringing of the inter-departmental telephone should pass automatically to any member of the staff who is present, in the temporary absence of the responsible head at that part of the works. A hooter signal, with coloured light indicator, operated by the main telephone switchboard attendant, provides a useful means of getting into contact with executive officers when required. As soon as the appropriate person reports upon the nearest available inter-departmental telephone, the indicator and hooter are cut off by the switchboard attendant.

A collection of the welding data that have appeared in *Oxy-Acetylene Tips*, the journal of the LINDE AIR PRODUCTS CO., 30 East 42nd Street, New York, is now available. The compilation includes charts, tables, and illustrated descriptions of the various types of flame adjustments, etc.; the booklet (Form 4600) can be obtained free of charge from the company.

LETTERS TO THE EDITOR

High Silicon Iron

SIR,—We are enclosing a photograph which shows a batch of high silicon iron castings that we think might be of interest to your readers.

The Lennox Foundry Company is busily engaged in the production of "Tantiron" for a great variety of chemical and explosive plants, but the urgent needs of production have

A batch of high silicon iron castings

not prevented the progress of research, the quality of Tantiron now being produced is better than ever before and the special method of manufacture which is now being used has enabled castings of a higher silicon content to be produced without sacrificing the strength of the metal.

Tantiron "Special" is a high silicon alloy having a guaranteed content of not less than 16 per cent. silicon, and users of this metal have declared it to be equal in every respect to the product marketed by Krupps as Thermisilid "E."—Yours faithfully,

London, S.E. LENNOX FOUNDRY CO., LTD.
April 15, 1941. BRIAN N. REAVELL.

Metallic Sodium in Germany

SIR,—The information contained in the article entitled "Metallic Sodium" (THE CHEMICAL AGE, *44*, 1134, p. 168) is somewhat misleading. Sodium is used as an alloy with one of the substances named, and also with calcium, for metal for bearings. It is true that it is important for the manufacture of "Tel." The article goes on to say that the only anti-knock agent used up till 1939 was alcohol. This is erroneous: Tel has been in full use by the militia and, as far as it was available, by the civilian population since 1934. Apart from this, prior thereto I.G.'s iron carbonyl was the widely used anti-knock.—Yours faithfully,

FRANKS LABORATORIES, LTD.
London, S.E. FRITZ FRANK, Ph.D., Director.
April 9, 1941.

Cheap Oxygen

SIR,—With reference to your note in THE CHEMICAL AGE (*44*, 1134, p. 163) on "Physical Research in Russia," I wish to point out that the production of cheap oxygen by separating air which is compressed only to four to six atm. is not an invention of Dr. Kapitsa. It is the well-known Linde-Fraenckl process.

In this country, too, one of these Linde-Fraenckl plants is operated, producing 930 cu.m./hr. oxygen of 98-99 per cent. purity. A much bigger plant of that kind was supplied by Linde in 1936 to Russia, separating 20,000 cu.m./hr. and producing 3500 cu.m. oxygen.

Maybe Dr. Kapitsa, who is undoubtedly an eminent physicist, is doing some additional work in trying to improve the Linde-Fraenckl process, but the principle, namely, the use of regenerators instead of counter-currents for the cooling of the air in order to reduce power consumption and to ensure the purification of the air from carbon dioxide and humidity, is an invention of Mr. Fraenckl, whose idea was carried out by the Linde Society.

Between 1930 and 1938 not less than 38 of these plants were supplied, mostly for producing water gas from cheap brown coal in a continuous process for hydrogenation. Cheap oxygen was therefore already at the disposal of the whole world before the war.—Yours faithfully,

Scunthorpe, P. BORCHARDT, Dipl.Ing.
April 9, 1941.

Higher Wages and Prosperity

SIR,—In the leading article, "Post-War Economic Reconstruction," of THE CHEMICAL AGE for April 5, two questions are asked which I should like to try to answer briefly.

First, to your question: "Will a general rise in costs and wages in terms of money leave us better off than we are to-day?" the answer is decidedly yes, because depression has never been overcome and full employment achieved, under freedom, without raising prices in general to the prosperity level. Also, prosperity has never flagged so long as prices in general have been maintained firm at the prosperity level under free competition. Prosperity conditions that would bring about a demand for labour and full employment would greatly benefit the present unemployed and the great majority of others whose prosperity depends upon the prosperity of the consuming masses.

Productive efficiency and productive power are *ever-rising*, and if when prosperity is achieved consuming power is not ever-rising also, the balance would be lost. Depression would soon rule again. It is for this reason that I say the prosperity general price level is the index which determines the wages best for both capital and labour. According to the London and Cambridge Economic Service the physical output per worker rose 4.5 per cent. per year, even under the unhealthy economic conditions in this country in the years 1930-35. In America, while wages and salaries were being raised at a fairly healthy rate in the years 1923-28, real wages rose 17 per cent. and profits rose 74 per cent. *without raising* the general wholesale price level in that period. Fundamentally America's period of prosperity ended because wages were not raised enough to maintain her general price level firm at the prosperity level, and thus to maintain America's consuming power in step with her *ever-rising* productive power.

Now in regard to the question raised about exchange; naturally, if prices in this country were allowed to rise to the prosperity level and other countries were content to remain under low prices and depression the exchange rates of sterling should be lowered so that the same quantity of British hats, for instance, would exchange for the same quantity of American guns as before. Care would be required to stabilise sterling exchange rates so as to maintain British payments abroad in approximate balance with payments received from abroad, and America would be confronted with a similar task, just as your question about exchange implies. But if Britain set out to manage sterling exchange rates so that exports would be kept in balance with imports without British tariffs, America would greatly benefit from this policy and would soon be co-operating in the management of the sterling-dollar exchange rate by lowering her tariffs, thus leading to further mutual benefits.

We have failed to enjoy prosperity and reap the potential benefits from *ever-rising* productive power simply because we have thought of wages too much from the standpoint of production costs and not enough from the standpoint of consuming power for the things produced. We have failed to enjoy the great benefits to be derived from free trade simply because we have had too much reverence for artificially fixed exchange rates and not enough respect for natural exchange rates—exchange rates flexible enough to keep our exports and imports in approximate balance without tariffs which would allow us to enjoy those benefits without any interference, by the prices and the standards of living abroad, with our own internal prosperity general price level.—Yours faithfully,

A. G. MCGREGOR.

180 Cranmer Court, S.W.3.
April 15, 1941.

Fumaric Acid in Industry

Possible Development of Resinous Compounds

THE recent commercial production of fumaric acid from starch and other carbohydrates by a new and efficient fermentation process has so lowered its cost as to make it a promising raw material for the chemical and allied industries. An examination of its properties as a raw material for synthetic resins, coating compounds, plasticisers, etc., made by C. K. Doscher, J. H. Kane, G. O. Cragwall, and W. H. Staebner, of Charles Pfizer and Co., Inc., Brooklyn, N.Y., is reported in *Ind. Eng. Chem.*, 1941, *33*, 3, 315-9. It was found that fumaric esters polymerised readily to form either thermoplastic or thermosetting resins; also that they copolymerised even more successfully with other plastic-forming materials to produce stable resins with useful properties. The method of working was indicated by the study of applications already made of maleic acid resins, maleic and fumaric acids being stereoisomers.

Diethyl fumarate (50 gm.) was heated on the steam bath for 24 hours with 1 gm. benzoyl peroxide, using a reflux condenser. The unpolymerised ester was distilled off under vacuum, leaving a residue of 46 per cent. of resinous material. The polymer softened to a viscous liquid when heated, but at room temperature the semisolid mass flowed with difficulty The soft gummy resin had a turbidity which was not present in the unpolymerised ester, believed to be caused by separation of benzoic acid in the polymer. The easy solubility of the polymer in the usual lacquer solvents suggests its use in coating compounds. Products obtained by copolymerising with other materials, such as vinyl derivatives, were found superior to those made from diethyl fumarate alone.

In the polymerisation of diethyl fumarate with the aid of benzoyl peroxide as a catalyst, a turbid product is formed by the precipitation of benzoic acid. Because clarity is generally an important quality in resinous materials, other catalysts were sought which did not have this undesirable effect. Samples of oleyl peroxide, stearyl peroxide, and linseed peroxide were obtained, and comparable polymers prepared with them, using 50 gm. diethyl fumarate to 1 gm. peroxide. After 24 hours on the steam bath the unpolymerised portions were removed by distillation, and the residues were weighed and compared. With oleyl peroxide a clear but brownish polymer, with a yield of 32 per cent. resulted; linseed and stearyl peroxides produced yields of only 22 per cent., the resin in the first instance being clear, but dark brown, in the second instance light brown and turbid. The preparation of a clear polymer from diethyl fumarate would therefore appear to depend on the selection of the proper catalyst. It is presumed that the brown colour was due to impurities in the catalyst, since no colour developed when pure benzoyl peroxide was used.

Promising Ester Resin

As an experiment in the polymerisation of fumaric glycol esters, 0.5 gm. benzoyl peroxide was dissolved in 2 gm. benzene, and the solution added to 20 gm. diethylene glycol fumarate. After standing overnight on the steam bath, the mixture solidified to a hard tough resin, insoluble in the ordinary organic solvents and infusible. This was the most encouraging resin yet produced from fumaric acid and appeared to possess desirable properties. In an experimental attempt to improve the colour and clarity, 7 moles of recrystallised fumaric acid were reacted with 7 moles of commercial diethylene glycol under oxygen-free conditions. The temperature was raised to 200° C. as rapidly as possible, and heating was continued until water was no longer evolved; 13 hours were required for the complete run. The resulting product was almost water-white. When cold, the product was extremely viscous, but could be easily manipulated when warmed.

A portion of the ester, treated with 2 per cent. benzoyl peroxide dissolved in 10 per cent. benzene, was maintained at 50° C. for 24 hours, but was not completely cured. However, after further heating at 50° C. for 72 hours, the resin became extremely hard and tough. Shrinkage was just enough to permit easy removal from the test tube. The ends were ground flat with a grindstone and took on a high lustre when polished with a buffing wheel. Other samples prepared in the same manner showed excellent machining qualities, and could be turned on a lathe, drilled, and cut with ease. A casting made in the shape of a bent rod showed the resin to have the property of bending light in the same manner as methyl methacrylate resins.

Copolymerisation Tests

Benzoyl peroxide (1.1 gm.) was dissolved in 10 gm. vinyl benzene, and the solution added to 100 gm. diethylene glycol fumarate at 50° C. After thorough mixing, the mass was poured into a Petri dish. On standing at room temperature for several minutes, the liquid gelled and its temperature increased rapidly. Within a few seconds the gel hardened to a glass-like resin, became extremely hot, cracked in many places, and yellowed slightly. The resin was examined after cooling and appeared harder than the straight diethylene glycol fumarate resin. This interesting result indicated a strong possibility of using this copolymer for compression moulding, the curing time being comparable to that required by ordinary urea and phenolic moulding compounds. In order to reduce the violence of the polymerisation the experiment was repeated with smaller quantities of catalyst. It was not until the benzoyl peroxide was reduced to 0.1 per cent. by weight that the mixture could be cast and cured at 50° C. without cracking. Under these conditions a hard clear resin was obtained after curing for 24 hours. However, even with 0.1 per cent. of catalyst the resin could be cured in a few minutes by heating to 100° C.

Diallyl fumarate was also tried as a copolymer and produced results similar to those obtained in the two preceding experiments. In addition it had the advantage of being compatible in all proportions. The hardness of the cured resin increased with the proportion of diallyl fumarate, higher concentrations making the resin brittle. This particular combination of copolymers is of value because it represents a resin containing only esters of fumaric acid. The results of these experiments on copolymerisation indicate that, by varying the quantity and type of copolymer, resins can be made from diethylene glycol fumarate having a wide range of properties.

Coating Compounds

Using acetone as a solvent, a coating compound was developed having the following percentage composition: 50 diethylene glycol fumarate, 48.9 acetone, 1.0 benzoyl peroxide, and 0.1 cobalt acetate. When coated on paper, glass, or metal and dried at 100° C. for 10 minutes, a hard tough film was produced having excellent properties. Experiments on the bonding of fabric, paper, cardboard, and wood showed the resin to have characteristics excellently suited to the laminating industries.

When incorporated with various fillers such as gypsum, paper pulp, or asbestos, and polymerised at 100° C., the fumarate resins yielded an interesting series of synthetics. A linoleum-like product was obtained from the following: 55.0 per cent. diethylene glycol fumarate, 5.0 diallyl fumarate, 39.9 gypsum, and 0.1 benzoyl peroxide. Replacing the gypsum with the same quantity of asbestos resulted in an unusually hard and tough substance, extremely resistant to impact.

It appears likely that the most immediate large-scale use of fumaric acid may result from its ability to take part in the formation of polymers suitable for paints, varnishes, moulding, and casting resins. However, this hitherto little-known dibasic acid, with its unsaturated structure and low molecular weight, has an unusual combination of properties and should prove useful in many industries.

Butadiene Manufacture

Aids to Cheap Production

IF synthetic rubber-like materials eventually fall to a price comparable with that of plantation rubber, this will be due in large measure to the perfecting of methods for production of butadiene from very cheap by-product butylene. The process is one of dehydrogenation, and has been closely studied both in the United States and Europe. At the meeting of the Rubber Division of the American Chemical Society in September, 1939, it was announced that a leading concern in the petroleum industry had secured yields of 20-30 per cent. butadiene by dehydrogenation of butylene with the aid as catalysts of vanadium oxides or chromium-molybdenum mixtures supported on aluminium, while operating at low pressures (0.25 atm.) and high temperatures (600–650° C.).

The Italian Institute for the Study of Synthetic Rubber has also occupied itself with the problem, in spite of the fact that Italy is far less favourably situated than the United States in respect of raw materials. In B.P. 532,942 the Institute outlines the conditions for high-yield conversion of α-butylene into butadiene, which are said to include the use of nickel as a catalyst and of carbon dioxide as a diluent. One reason for the unexpectedly high speed of conversion in presence of carbon dioxide is the reduction in carbon deposition upon the catalyst, but other factors must come into play, and it may be that the carbon dioxide participates in an intermediate reaction which is kinetically more rapid. In operating the new process a mixture containing equal volumes of α-butylene and carbon dioxide may be passed through a bentonite layer heated to 575° C. on which 5 per cent. nickel has been deposited (by reduction of a nickel salt *in situ*). From the resulting mixture of butadiene, butylene, and carbon dioxide, the two latter are separated and returned to the catalyst chamber in a continuous cycle, while the butadiene may be stored for future use or immediately converted into rubber-like products by the well-known method of sodium-polymerisation.

Chemical Industry in the "New Order"

Axis Plans Outlined by I.G. Chairman

THE I.G. Farbenindustrie A.G., of Frankfurt-am-Main, has increased its ordinary capital by the issue of RM. 10,000,000 of new ordinary shares. These were introduced to the Stock Exchange in February and the proceeds will be used for financing extensions. The authorised capital originally amounted to RM. 80,000,000 (1938). Of this amount, R.M. 1,000,000 of new ordinary shares were issued in September, 1939, a further RM. 32,200,000 in August, 1940, and a further RM. 10,000,000 as above, leaving RM. 26,800,000 unissued.

Dr. C. Krauch, chairman of the I.G., recently gave an address in which he outlined Germany's plans for the "New Order" in the European chemical industry. European chemistry, he explained, would be based on the fullest development of the chemical industries of the individual countries and the division of tasks by general agreement. It would be developed according to a plan which would aim at rendering Europe self-supporting against any economic combination of the outside world. Scandinavia was already contributing a major proportion of the iron ore used in Europe, but other ore deposits remained to be opened up, while, perhaps more important, water-power resources awaited exploitation. A considerable part of such new chemical plants as required large quantities of electric current might well be located here, such as light metal smelting plants and plants for the production of synthetic fertilisers. The future demand for fertilisers for the rehabilitation of agriculture in France, Spain, and the Balkans could thus be almost entirely met from Norway. The North, with its forest riches, could also take over an increasing proportion of cellulose and staple fibre production.

So far as France was concerned, it would, with its valuable bauxite deposits, play an increased part in future light metal production, while its important inorganic chemical industry must be expanded in order more nearly to meet increased demands in France and neighbouring countries. Rivers on the Swiss frontier would form a good source of power. Spain's task would mainly be the supply of pyrites and other ores, in return for which it would receive manufactured goods, including fertilisers and chemicals.

Yugoslavia would develop an electrochemical industry based on water-power, while Bulgaria and the other Balkan states would contribute raw materials; Yugoslavian and Hungarian bauxite were already an important factor in European economic co-operation. The Swiss chemical industry with its manufactured products would remain of importance, while the great importance of Rumania had already been demonstrated in its co-operation with the Axis powers, and its oil industry and a chemical industry based on petroleum by-products would be fostered. It was obvious that Italy's highly developed electrochemical industry and its other organic and inorganic industries would play their rôle in the "New Order," in addition to the valuable Italian contribution of mercury and crude sulphur.

Syndicates for the organisation and distribution of spheres of production would have to be set up, and a reorganisation of transport conditions would be involved. The leading part in this scheme would be taken by the Axis powers, who would supply Europe with synthetic rubber as a substitute for the only important industrial raw material not produced in Europe or—at present—in Africa.

Adsorptive Carbon Production

A New Use for Sewage Sludge

FROM Japan comes an account of experiments directed at the production of an adsorptive carbon from sewage sludge (*J. Soc. Chem. Ind. Japan*, 1940, *43*, 33B). It was found that when the sludge was coked it contained only 22-24 per cent. of carbon, and the experiments were directed towards increasing this proportion by extraction of the inorganic diluents. The following treatment was found effective. One gram of the coke was boiled for half an hour with 20 ml. of 11 per cent. hydrochloric acid, filtered, washed with warm water, dried and mixed with about 0.5 gr. granular sodium hydroxide and 15 ml. water. After boiling for half an hour the residue was filtered off, washed with warm water, and dried at 105° C., when the carbon content was found to have been increased to 36-37 per cent. or, if sludge from the activated sludge process had been used, to 49.4 per cent. The adsorptive capacity of the coke was increased by this treatment from 0.75 mg. methylene blue per gram, or 15.8 m. iodine per gram, to 12.65 and 65.6 mg. respectively.

POTASH SUPPLIES

Undermentioned is the schedule of products and processes for the preparation of which 5 cwt. of caustic potash can be supplied without a licence by authorised suppliers:

Liquid soap; potash sulphurate; potash oxalates; foam compounds (fire fighting); bituminous products; disinfectants; potassium ferrocyanide; potassium metabisulphite; pharmaceutical preparations; horticultural sprays; soft soap (textile); soft soap (cutting); electrolytes; oxygen drying; active carbon; water-proofing cement; rapid hardening cement; wire-drawing paste; argaline; and catalyst for sulphuric acid.

The quarterly edition of the WILD BARFIELD Heat Treatment Journal, issued from the works at Watford, Herts, contains two articles. One is entitled "Flakes and Cooling Cracks in Forgings" and the other deals with the finding of faults in pyrometer equipment.

Infra-Red Rays in Chemistry

Towards the Understanding of Molecular Structure

MANY years ago, so long ago that in his maturer years one apparently wishes to forget it, Dr. G. H. Hardy, the eminent mathematician, enunciated the *mot*: "A science is said to be 'useful' if its development tends to accentuate the existing inequalities in the distribution of wealth, or more directly promotes the destruction of human life." To the *incognoscenti*—the chemical engineers, the mechanical engineers, the business men and other lesser breeds outside the chemical pale!—the study of infra-red structure, a structure which cannot be seen but only detected indirectly, must appear singularly inept. Neither dividends nor death-dealing machines are likely to emerge immediately from the study and thus, by Dr. Hardy's sardonic definition, such studies cannot be useful.

Nevertheless, they have in point of fact great actual and potential value. Gerhard Herzberg, a foremost American authority, has admirably summarised their value in his book on "Molecule Structure and Molecular Spectra." This study he finds to be one of the most important, perhaps the most important, means for investigating molecular structure. From the spectra the various discrete energy states of a molecule can be derived directly. From these again we can draw accurate and reliable conclusions concerning the motion of the electrons (electronic structure) and the vibration and rotation of the nuclei in the molecule. The study of electronic motions has led to a deeper theoretical understanding of chemical valency. From the vibrational frequencies the forces between the atoms in the molecule, as well as the heats of dissociation of molecules, can be calculated with great accuracy. From the rotational frequencies we obtain accurate information about the geometrical arrangement of nuclei in the molecule—in particular, extremely accurate values for the internuclear distances. The knowlege of the different proportions of the individual molecules so obtained allows us to understand many of the physical and chemical properties of the gases under consideration and, in fact, sometimes to predict those properties, *e.g.*: the specific heat and magnetic susceptibility. Also, on the basis of this knowledge, chemical equilibrium can be predicted theoretically and elementary chemical processes can be elucidated. A further important result of the investigation of spectra is that proof has been obtained of the existence of a larger number of molecules which were previously unknown in chemistry or were thought not capable of free existence. Among these are CH, OH, C_2, HC_2, Na_2 and CP.

Dr. Fox's Address

Dr. J. J. Fox gave a lucid and instructive address upon the subject of infra-red absorption and molecular structure recently before a joint meeting of the Institute of Chemistry and the Institute of Physics. Much work has been done upon chemical and physical structure by the aid of X-ray analysis and forms the basis of modern crystallography. The spectra thus obtained are too complex for use in elucidating the more complicated molecular structures, and experimenters have been led to examine the infra-red regions. Modern infra-red photography enables the spectra to be photographed nearly up to 2μ. But the range over which spectrum investigations have been made extends up to 20μ, so that the method generally used is to measure the absorption by means of thermopiles, bolometers, radiomicrometers, or radiometers. Spectra in the visible region or in the ultra-violet may be either line or absorption, but in the infra-red region absorption is always used except perhaps occasionally in the very near infra-red. In the technique now developed the absorption is measured at very small intervals over the band and the resulting observations are graphed against wave-length as abscissæ. The requisite dispersion is obtained by means of a rock-salt prism.

Dr. Fox showed how by mathematical treatment of the absorption curves the distance apart of molecules in an atom could be deduced. For diatomic molecules this treatment is not too difficult, but for organic compounds it is exceedingly difficult, and the mathematics become practically impossible. Fortunately, the observation has been made that the chemical groups in a molecule absorb infra-red radiation in a manner peculiar to themselves and as if the rest of the molecule had scarcely any influence. This is not surprising, since in normal chemistry the individual groups also behave in this manner. Each group, therefore, gives its characteristic absorption bands and from these bands it is possible to determine, first whether the groups are present as such in a particular molecule, and secondly whether there is association and if so to what extent. Sometimes groupings are to be found, particularly .OH groupings which should not be present according to the chemical interpretation of the structure. These are clearly due to what our ancestors might have called "left-handed" association of H from one grouping with O from another and this only happens when the H and O are within about 2½ Å of one another. Dr. Fox's exposition, in conjunction with the earlier paper by Dr. Astoury (THE CHEMICAL AGE, *44*, 1129, p. 93), shows how greatly the more abstruse forms of physics are coming to the assistance of chemistry.

Chemical Fire Extinguishers

Approved Pattern Described

ALTHOUGH there has lately been a lull in the enemy's large-scale air-raids on this country, the menace of the fire-bomb is still with us, and up-to-date information regarding methods of combating this menace when and if it takes shape is of paramount interest to all who have property in their care. According to a memorandum just issued by the Fire Extinguisher Trades' Association, by permission of the Ministry of Home Security, large numbers of hand fire extinguishers are now being mobilised to meet the war fire danger. Recent Ministry of Home Security official tests, it is stated, proved the soda-acid type and the water and compressed CO_2 type extinguishers to be highly effective on both the incendiary bombs and fires caused by them. An outstanding advantage of these hand extinguishers is that they can be operated single-handed, simply by striking a knob or being turned upside down. They are generally of two gallons capacity, and it is estimated officially that three-quarters of a gallon is required to deal with the bomb itself, leaving about one and a quarter gallons for any resultant fires. Such extinguishers are usually installed in buildings at sufficiently frequent intervals to permit more extinguishers being brought into action quickly to follow up the use of the first one, should this be necessary. They expel a powerful jet to a distance of approximately 30 ft. which enables the operator to keep well outside the official range of not less than 10 ft. or 12 ft. when using a direct jet. Dual (jet and spray) nozzles, as used on stirrup pumps, have also been approved.

THE FIRST PETROLEUM toluene refinery has recently been opened in Houston, Texas, by the Shell Oil Co. The new process will help to prevent the recurrence of the serious bottleneck caused during the last war by limited facilities for recovering toluene from coal tar. The plant will produce over 2,000,000 gal. annually, from which it is possible to produce about 20,000,000 lb. of trinitrotoluene.

FROM THE RESEARCH LABORATORIES of the General Electric X-ray Corporation in America comes the announcement of the solution of a difficult lubrication problem. To lubricate a rotor operating in a vacuum in an X-ray tube, oils and greases are not permissible because of their high vapour pressures. It was found that when a thin film of metallic barium was applied to the bearing, the speed of the rotor rose to over 3500 r.p.m., the noise was reduced, and the coasting time was increased from twelve seconds to eight minutes.

Personal Notes

MR. C. MCCULLOCH has been appointed chief engineer to the joint works of Hardman and Holden, Ltd., and the Manchester Oxide Co., Ltd.

MR. RAYMOND EVERSHED, K.C., Chairman of the Central Price Regulation Committee, has been appointed a member of the Industrial and Export Council.

MR. ROBERT N. MCFADYEN and MR. RICHARD W. SEALY have been awarded the B.Sc. Degree, with honours in Chemical Engineering, at the University of Glasgow.

MR. E. W. EDWARDSON was re-elected chairman at the fifth annual meeting of the Soapmakers' Association recently held at Leicester, MR. W. M. MCNICHOL was re-elected vice-chairman and MR. A. H. CHARLTON was re-elected hon. secretary of the association.

MR. E. D. GRIFFITHS, M.Sc., F.I.C., head of the chemistry department of the East Ham Technical College since 1918, is retiring next month. He was trained at University College, Aberystwyth, and has obtained high honours including the Fellowship of the Institute of Chemistry in 1921. During the last war he carried out research work for the Ministry of Munitions on ferrosilicon.

OBITUARY

MR. JAMES MCINTOSH FISHER, who died in London on April 14, was a director of May and Baker, Ltd.

MR. DAVID WILLIAM MACDONALD, who died at Rothesay on April 14, was for many years with the Tharsis Sulphur and Copper Co., Ltd.

MR. ARTHUR BEST, who before joining the R.A.F. last October was in partnership with his brother, Mr. Fred Best, at Exeter, as an oil merchant, died at King's Lynn on April 6, aged 30, from injuries received in a motor accident.

SIR ALBERT CHARLES SEWARD, Sc.D., D.Sc., LL.D., F.R.S., who died suddenly at Oxford on April 11, aged 77, was especially noted in the realm of botany and palæontology. He was President of the British Association in 1939 and served on the Advisory Council for Scientific and Industrial Research, retiring in October last year. He was a native of Lancaster, and was educated at Lancaster Grammar School and St. John's College, Cambridge.

MR. GEORGE OSWALD MARSH, B.Sc., whose death at the age of 29 through enemy action is reported, was regarded in the scientific world as a most promising research worker and inventor. Though perhaps best known for his wireless engineering work (he erected his own set and was granted a transmitting licence at the age of 11), he was also a distinguished chemist, having won the H. J. Powell Prize, "for originality in chemical research work" in 1929. At the time of his death he was engaged in Government work, and was a key man at the factory where he was employed.

Chemical Matters in Parliament

Creosote Fuel

IN reply to a question by Mr. Thorne in the House of Commons last week, Mr. Montague, Parliamentary Secretary to the Ministry of Transport, said that a certain number of omnibuses were run on creosote mixtures, and a revised scheme for rationing creosote and other home-produced heavy oils used as motor fuel was brought into operation on January 24 last. Creosote was in great demand for the war effort for purposes other than transport.

Russian Oil Exports

Mr. Cocks asked whether the Minister of Economic Warfare had received information as to whether Russia had stopped the export of oil to Germany since March 1.

Mr. Dalton replied that his information showed that very little, if any, oil had reached Germany from the U.S.S.R. since March 1. It would, however, be premature to draw the conclusion that this traffic has been stopped.

Fertilisers

Sir P. Hannon asked the Minister of Agriculture whether his attention had been called to the publication by the Rothamsted Experimental Station of a brochure entitled "Fertilizer Policy in War-time," in which emphasis was laid on the deficiency of nitrogen in the soil of this country, whether he had any information as to how much more nitrogeneous fertilisers was used by continental farmers than in Great Britain; and whether the dressings of sulphate of ammonia were receiving encouragement at the instance of war agricultural committees.

In a written reply, Mr. Hudson stated that the answer to the first part of the question was in the affirmative; as to the second part, he understood that the rate of application of nitrogenous fertilisers in some Continental countries was appreciably greater than in Great Britain as a whole; but such comparisons were apt to be misleading owing to wide differences in the livestock population per acre, in the proportion of clover leys and in the soil conditions. As to the third part of the question, he referred to the reply he gave on March 6 to a similar question.

In reply to a question by Mr. Lambert as to whether he could increase the supplies of phosphates and potash in Devonshire, as, without these fertilisers, the farmers could not comply with the orders of the county war agricultural committee to grow potatoes, Mr. Hudson stated that the available supplies of phosphate and potash had been distributed throughout the country this season as evenly as possible. The supply of potash was very limited and it was not possible to make any special allocation to Devonshire, though that county would continue to receive its share of the potassic fertilisers available. As regards phosphatic fertilisers, additional supplies had been made available in Devonshire.

Workers' Aid for the Red Cross

Approaching the Ten-Million Mark

LAST April, three months after its foundation, the Red Cross Penny-a-Week Fund had 500,000 regular contributors. This April it has 5,000,000, a ten-fold increase in twelve months. To-day, contributors amongst the workers of two industries alone—railway transport and mines—number 600,000, or 100,000 more than the total membership a year ago. Greater London has 750,000 contributors against 8000 in April, 1940. Employees of the Manchester Ship Canal are contributing to the Fund at the rate of more than £100 a month.

Never before have the ordinary man and woman played such an important part in providing the Red Cross with the funds necessary for its essential war-time activities. And that part will soon be greater still, for in view of the outbreak of hostilities in the Balkans and the rapidly mounting expenditure of the Red Cross, the Fund is to intensify its campaign for more members. It is estimated that of the 15,000,000 workers engaged in trade, industry, and public service, at least 10,000,000 will be regular Penny-a-Weekers by the end of this year. If this is achieved it will mean that the workers will be contributing to Red Cross funds at the rate of £1,750,000 a year. If you wish to help write to the Secretary, Red Cross Penny-a-Week Fund, 89 Kingsway, London, W.C.2.

THE DESTRUCTION OF THE glycerine-extraction plant in the Lofoten Islands by a British raiding party has had an unexpected effect in northern Norway. According to a correspondent of *The Times*, fresh fish has now suddenly become plentiful there again. With the further damage done recently to other fish-oil processing plants by a Free Norwegian raid, there should be a positive glut of fish in the district. Strange indeed is the Axis war-time economy, which causes chemical engineering to be the enemy of a rational food supply.

General News——From Week to Week

THE REVISED SCHEDULE OF RESERVED OCCUPATIONS makes no alteration in the age of reservation of chemical workers.

MESSRS. HUNTER AND WARREN, LTD., explosive merchants, Glasgow, have presented £50 to the Clydeside Air Raid Distress Fund.

THE SUM OF £300 has been contributed to the Clydeside Air Raid Distress Fund by the employees and staff engaged in the Scottish Shale Oil Industry, per Scottish Oils, Ltd.

FATAL INDUSTRIAL ACCIDENTS in Great Britain and Northern Ireland during February totalled 279, compared with 276 last January and 210 in February, 1940. The figure does not include the deaths of seamen. Fifty-two cases of industrial disease were reported during February and five deaths.

SUCCESSFUL EXPERIMENTS have been carried out by South Shields Corporation with gas-driven buses. Two of these have been in operation since last September and others will be introduced later. Mr. H. J. Troughton, Corporation Transport Manager, states that each gas-bag contains 600 cu. ft. of gas and takes about seven minutes to fill. One charge will cover 18 miles and for ignition purposes the consumption of fuel oil is about 1 gal. per 50 miles. Tests are being made to bring about further economies in consumption.

THE BOARD OF TRADE INDEX NUMBER for wholesale prices of industrial materials and manufactures for the month of March is 154.3 (1930=100), a rise of 0.9 per cent. on February. For chemicals and oils the figure is 125.5; for iron and steel 180.9; for non-ferrous metals 124.2. Compared with February, these figures show respective rises of 0.9, 0.2, and 0.3 per cent. Imported iron ore and tin account for the rises in the metal groups, while advances of about 7½ per cent. in the price of sulphuric acid and of 12 per cent. in the price of varnish are the principal items affecting the figure for oils and chemicals.

WITH ITS ISSUE FOR APRIL 12, the *Pharmaceutical Journal* makes what is modestly described as "an endeavour to reproduce a small part of a picture covering the events of a century of organised British pharmacy"—in fact, the centenary of the Pharmaceutical Society of Great Britain. Actually, the centenary number is a most interesting and attractively-produced record of those hundred years, especially praiseworthy in these days of paper shortage. The reproductions of old illustrations are well chosen and the articles have an interest for many more than those professionally concerned with "drugs, chemicals, galenicals, and sundries."

Foreign News

OIL HAS BEEN DISCOVERED in the Central Ukraine, near Kiev, after six years' surveying.

THE SHORTAGE OF FORMIC ACID experienced during the early months of the war on rubber estates in Malaya has now been overcome by the importation of acetic acid from Canada.

ANOTHER EXPLOSION, the second within a month and the third since September, took place last week at one of the New Jersey factories of the Hercules Powder Co.

GAS INHALED THROUGH A CIGARETTE killed Frank Henry Harvatt, of Sydney, New South Wales, reports the B.U.P. He was using trichloroethylene when he lighted a cigarette, thereby producing phosgene, which killed him a few hours later.

A PLANT FOR THE PRODUCTION of sodium carbonate is planned by the Ministry of Industries and Mines in Iran. The site is stated to be about 75 km. west of Tehran, but no information is yet available as to the size of the undertaking.

THE U.S. GOVERNMENT, it is stated, has expressed its dissatisfaction at the prices ruling for mercury, and has threatened an official maximum unless prices quickly fall to a more reasonable level.

OUTPUT OF SULPHURIC ACID in India for the year ended March 31 was 598,360 cwt. against 505,700 cwt. for 1938-39. Production of ammonium sulphate also rose from 14,800 to 19,800 tons.

CALCIUM ALPHA-HYDROXY-ISOBUTYRATE, produced commercially for the first time by the American Cyanamid Co., and marketed in borated solution as calcium "borohibate," provides calcium in readily assimilable form.

THE IMPORT INTO THE STRAITS SETTLEMENTS of hydrochloric or sulphuric acid, or any mixture or preparation thereof, which can be used in the coagulation of rubber, is now prohibited, except under licence. A similar provision is also in force in respect of acetic acid.

AN INTERIM DIVIDEND of five per cent. has been distributed by the Cie. des Produits Chimiques et Electrometalliques d'Alais, Froges et Camargue (Péchiney) for the sixteen months from September 1, 1939, to December 31, 1940, on a capital of 459,000,000 francs, compared with nine per cent. paid for the previous eight months on a capital of 344,000,000 francs.

FRENCH MANUFACTURERS are no longer to use copper, nickel, cobalt, pewter, zinc, lead, cadmium, magnesium, or mercury, or alloys of these metals, according to a Reuter message from Vichy. They are being given three months to find substitutes, and are forbidden to accept orders for goods containing the prohibited metals.

THE PRODUCTION of U.S. crude copper in March, according to the Copper Institute, rose to 85,643 tons, compared with 79,093 tons in February. The refined production was 95,322 tons, against 93,654, and domestic deliveries were up from 112,808 tons to 134,333. Refined stocks were reduced to 89,873 tons at the end of the month.

ESTIMATES SUBMITTED BY DR. R. R. SAYERS, Director of the U.S. Bureau of Mines, show that the total mineral production for the past year in the United States surpasses all previous totals except those of 1917, 1918, and 1920. The estimated total value of all mineral products was $5600 million. 15 per cent. above 1939. A short review of the 28 per cent. increase in metallic products will be included in our next Metallurgical Section.

SCOTTISH MALAYAN ESTATES, LTD., and the Strathmore Rubber Co., Ltd., each report an increase in the palm oil crop for March, 1941, as compared with March, 1940. The former, with 116,000 tons, shows an increase of 35,821 tons, the latter, with 14,000 tons, marks a rise of 3025 tons. The Selangor Oil Palm Co., Ltd., however, shows a decrease from 116,071 tons to 89,000 tons. In no case is a crop of palm kernels recorded for March, 1941.

Forthcoming Events

IN PLACE OF THE ANNUAL DINNER DANCE, the Midland Committee of the Society of Chemical Industry has arranged a formal luncheon at the Midland Hotel, Birmingham, at 1.30 p.m., on April 26. Ladies may be invited. After short speeches there will be dancing, followed by a display of cinematograph films until 5 p.m. Tickets, application not later than April 21, can be had from George King, for 7s. 6d. each, at 39 Upland Road, Selly Park, Birmingham, 29.

THE ROYAL SOCIETY OF ARTS, John Adam Street, Adelphi, London, W.C.2, is holding two Dr. Mann Lectures on April 28 and May 5 at 2.30 p.m. Dr. G. S. Whitby, Director of the Chemical Research Laboratory, Teddington, will speak on the subject of "Chemotherapy."

THE 47TH JAMES FORREST LECTURE of the Institution of Civil Engineers, Great George Street, London, S.W.1, will be delivered on April 29, at 1.30 p.m., when Professor E. N. da C. Andrade will talk on "The Mechanical Behaviour of Solids."

A CONCENTRATED THREE-DAY COURSE OF LECTURES, demonstrations and films on the organisation and methods of industrial training will be given at the National Institute of Industrial Psychology, Aldwych House, London, W.C.2, from April 29 to May 1. This follows a successful course on the organisation of war-time training of industrial workers held during March. The course is open to nominees from firms. The fee for one representative will be five guineas and for two from the same firm seven guineas.

A JOINT MEETING of the Coke Oven Managers' Association and the Institute of Fuel will be held on April 30, at the Royal Victoria Station Hotel, Sheffield, at 2.30 p.m., when Dr. E. W. Smith (Woodall-Duckham Companies) will present a paper entitled "Research and the Coking Industry," to be followed by a discussion.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

MANUFACTURE OF HYDROGEN.—J. G. King, C. M. Cawley, and S. H. Richards. 2548.

NICKEL ALLOYS.—Mond Nickel Co., Ltd. (United States, March 16, '40.) 2330.

CASTINGS OF NICKEL-COPPER ALLOYS.—Mond Nickel Co., Ltd. (Canada, March 29, '40.) 2399.

PRODUCTION OF MAGNESIUM BASIC CARBONATE.—Ocean Salts (Products), Ltd., W. E. Prytherch, J. H. Anderson, and B. A. Adams. 2485.

MANUFACTURE OF $\alpha:\beta:\gamma:\delta$ DOUBLY UNSATURATED KETONES.—Soc. of Chemical Industry in Basle. (Switzerland, Feb. 10, '40.) 2320.

MANUFACTURE OF PIPERIDINE COMPOUNDS.—Soc. of Chemical Industry in Basle. (Switzerland, Feb. 26, '40.) 2544.

FOUNDRY COMPOSITIONS.—W. W. Triggs (Eastern Clay Products, Inc.). 2504.

MANUFACTURE OF NON-SATURATED ALDEHYDES.—Usines de Melle. (France, March 6, '40.) 2403.

ALLOYS OF TUNGSTEN.—T. Hamilton-Adams. 4049.

PRODUCTION OF TUNGSTEN ALLOYS.—T. Hamilton-Adams. 4050.

PRODUCTION OF HIGHLY-CONCENTRATED NITRIC ACID.—Bamag, Ltd., and A. H. Manning. 3831.

PREPARATION OF THERAPEUTICALLY USEFUL COMPOUNDS.—Boots Pure Drug Co., Ltd., H. H. L. Levene and F. L. Pyman. 3896.

PREPARATION OF MODIFIED ALKYD RESINS.—British Resin Products, Ltd., and J. J. Wilson. 3884.

PRODUCTION OF SYNTHETIC RESINS.—British Thomson-Houston Co., Ltd. (United States, March 26, '40.) 3798.

SYNTHETIC RESINOUS COMPOSITIONS.—British Thomson-Houston Co., Ltd. (United States, March 27, '40.) 3853.

PRODUCTION OF PEROXIDISED ESTERS.—British Thomson-Houston Co., Ltd. (United States, March 27, '40.) 3854.

CONDENSATION PRODUCTS.—British Thomson-Houston Co., Ltd. (United States, March 26, '40.) 4023.

PROCESS FOR MINERALISING OF FIBROUS SUBSTANCES.—L. St. J. Colley. 3856.

DEGREASING OF METALS, ETC.—R. Cosway and Imperial Chemical Industries, Ltd. 3943.

MANUFACTURE OF TRANSLUCENT MATERIALS.—H. Dodd, D. E. Woods, and Imperial Chemical Industries, Ltd. 3944.

PRODUCTION OF STYRENES, ETC.—Dominion Tar and Chemical Co., Ltd. (United States, April 24, '40.) 4032.

GLASS SUBSTITUTES.—Dufay-Chromex, Ltd., and A. R. Wickham. 3838.

MANUFACTURE OF COATED ARTICLES.—E. I. du Pont de Nemours and Co. (United States, March 21, '40.) 3861.

MANUFACTURE OF POLYMERISABLE ESTERS and resinous materials derived therefrom.—E. I. du Pont de Nemours and Co., (United States, March 22, '40.) 3945.

MANUFACTURE OF MACHINES FOR MIXING SOLIDS.—K. B. Edwards. 3801.

PRODUCTION OF HALOGEN SUBSTITUTED AMINOARYL SULPHONIC ACID DERIVATIVES, and resulting products.—J. R. Geigy A.-G. (Dec. 22, '39.) (Switzerland, Dec. 24, '38.) 3868. (Dec. 22 '39). (Switzerland, Dec. 31, '38.) (Cognate with 3868.) 3869.

CONTAINERS, ETC., FOR FLUIDS.—E. J. Goemans and Bottle Patents, Ltd. 4017.

Complete Specifications Open to Public Inspection

METHOD OF AND APPARATUS FOR DETECTING CHANGES in composition of liquids.—Wallace and Tiernan Products, Inc. Aug. 18, 1939. 7419/40.

HYDROXYALIPHATIC THIOAMMELINE ETHERS.—Resinous Products and Chemical Co. Aug. 19, 1939. 9712/40.

PREPARING COMPOUNDS OF PHENOLPHTHALEIN and the improved compounds produced thereby.—Bristol-Myers Co. Aug. 19, 1939. 10057/40.

SELECTIVE SOLVENTS FOR OLEFINES.—Standard Oil Development Co. Aug. 19, 1939. 10574/40.

MANUFACTURE OF DIHYDRIC ALCOHOLS.—Standard Oil Development Co. Aug. 19, 1939. (Cognate application, 12108/40.) 12107/40.

METHOD OF AND MEANS FOR EMULSIFYING OILS, waxes, greases, and the like.—L. J. Howlett, W. H. Howlett and R. H. Warneford. Aug. 24, 1939. 12479/40.

TEMPERATURE-CONTROL SYSTEMS FOR ELECTRIC FURNACES.—British Thomson-Houston Co., Ltd. Aug. 18, 1939. 13050/40.

POLYMERIC ESTERS.—E. I. du Pont de Nemours and Co. Aug. 24, 1939. 13452/40.

MANUFACTURE OF POLYMERISABLE MATERIALS and products derived therefrom.—E. I. du Pont de Nemours and Co. Aug. 24, 1939. 13453/40.

MANUFACTURE AND APPLICATION OF STABLE SUSPENSIONS.—Soc. of Chemical Industry in Basle. Aug. 19, 1939. 14090/40.

Complete Specifications Accepted

EMULSIFYING APPARATUS.—British Emulsifiers, Ltd., and T. Curzon. June 29, 1939. 530,191.

METHOD OF FIRMLY UNITING RUBBER with inserts or applied layers of fibrous material.—Gummiwerke Fulda, A.-G. July 6, 1938. (Cognate Application, 19056/39.) 530,204.

DYEING LEATHER, production of disazo dyestuffs more especially for use therein, and the resulting dyestuffs.—J. R. Geigy, A.-G. April 27, 1939. 530,215.

MANUFACTURE OF GLYCOL DERIVATIVES.—Distillers Co., Ltd., H. M. Stanley, and P. Eaglesfield. July 1, 1939. 530,230.

ADHESIVE MATERIAL.—Durex Abrasives, Ltd., and C. H. Corwin. March 30, 1939. (Divided out of 527,298.) 530,301.

MANUFACTURE OF HYDROGEN PEROXIDE.—H. G. C. Fairweather (Mathieson Alkali Works). Jan. 23, 1939. 533,633.

MANUFACTURE OF STEEL AND STEEL ALLOYS.—Soc. d'Electro-Chimie, d'Electro-Metallurgie, et des Aciéries Electriques d'Ugine. Feb. 10, 1938. (Cognate application, 4343/39. 533,671. March 30, 1938. 533,703.

PRODUCTION OF SOAP COMPOSITIONS.—W. J. Tennant (Armour and Co.). July 8, 1939. 533,846.

DISTILLATION OF MATERIALS CONTAINING FATTY ACIDS.—W. J. Tennant (Armour and Co.). July 12, 1939. 533,847.

APPARATUS FOR HEAT-TREATING METAL BODIES.—Shorter Process Co., Ltd. (Linde Air Products Co.). July 13, 1939. 533,774.

ARTIFICIAL FERTILISERS, and the method of manufacturing the same.—J. Ray. July 20, 1939. 533,849.

MANUFACTURE AND USE OF AZO DYES.—G. H. Ellis and H. C. Olpin. Aug. 17, 1939. 533,713.

PRODUCTION OF LIGHTER HYDROCARBONS from coal by heat treatment.—B. Blakemore. Aug. 18, 1939. 533,715.

MAGNESIUM BASE ALLOYS.—Magnesium Elektron, Ltd., C. J. P. Ball and F. A. Fox. Aug. 21, 1939. 533,719.

ACYLATED CYCLOPENTADIENES and their polymers, and process of producing the same.—Armour and Co. Sept. 2, 1938. 533,919.

ACYLATED INDENES and polymerisation products thereof, and processes of preparing the same.—Armour and Co. Sept. 2, 1938. 533,920.

ELECTROLYTIC PREPARATION OF YELLOW CUPROUS OXIDE.—Rohm and Haas Co. Dec. 19, 1938. 533,931.

PRODUCTION OF LUBRICANTS.—J. G. Fife (N. V. de Bataafsche Petroleum Maatschappij). Oct. 13, 1939. 533,933.

SEPARATION AND RECOVERY OF SHORT FIBROUS ASBESTOS from granular asbestos-bearing rock.—Turner and Newall, Ltd., and W. J. Ellison. Nov. 14, 1939. 533,942.

METHOD FOR MAKING PLASTIC COMPOSITIONS.—Carbide and Carbon Chemicals Corporation. Dec. 15, 1938. 533,746.

MANUFACTURE OF MULTICELLULAR GLASS.—S. A. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny and Cirey. Dec. 20, 1938. 533,763.

THERMOPLASTIC PRINTING INKS.—Interchemical Corporation and A. H. Stevens. Dec. 8, 1938. 533,768.

MANUFACTURE OF PHTHALIC ACID MONO-ARYLAMIDES.—J. R. Geigy A.-G. Nov. 30, 1938. 533,800.

DYEING APPARATUS.—G. Jacobson. Nov. 28, 1939. 533,811.

COKING OF PETROLEUM RESIDUES and the like materials.—A. Fisher. Dec. 1, 1939. 533,828.

HEAT-EXCHANGE OR OTHER APPARATUS comprising parallel paths for the flow of fluid.—Superheater Co., Ltd., and E. A. Robinson. Dec. 5, 1939. 533,858.

PRODUCTION OF A WATER GAS particularly suitable for synthetic purposes.—G. Szigeth. Dec. 10, 1938. 533,877.

PRODUCTION OF COPPER BASE ALLOYS.—Mallory Metallurgical Products, Ltd. (P. R. Mallory and Co., Inc.). Dec. 8, 1939. 533,880.

PRODUCTION OF POLYHYDRIC ALCOHOLS by electrolytic reduction of reducible saccharides.—Atlas Powder Co. Dec. 17, 1938. 533,884. Jan. 7, 1939. 533,885.

PRODUCTION OF HOT GASES under pressure by means of a gas turbine.—A.-G. Brown, Boveri and Cie. Dec. 27, 1938. 533,893.

ELECTRODEPOSITION OF METALS.—W. W. Triggs (Harshaw Chemical Co.). Dec. 13, 1939. (Addition to 528,498.) 533,901.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—**The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.**)

MASSON SEELEY & CO., LTD., London S.W. (M., 19/4/41). Chemical engineers, &c.—March 25, £7,000 1st debenture, to Bishopsgate Nominees Ltd.; general charge (excluding certain hire purchase agreements). *£8000. June 5, 1940.

RIBBLE PAINTS & VARNISHES, LTD., Blackburn.—(M., 19/4/41). March 25, deed and debentures, to J. C. Southworth, Clitheroe, and another securing sums not exceeding £15,000, which the holders may be called upon to pay under a guarantee; general charge. *Nil. April 26 1940,

Satisfaction

R. McIVOR & SONS, LTD., Birkenhead, cement manufacturers.—(M.S., 19/4/41). Satisfaction March 20, of mortgage registered. February 27, 1934.

County Court Judgments

SHERWOOD, R. L., 31 Sefton Street, Litherland, chemist. (C.C.J., 19/4/41). £14 10s. 10d. January 16.

SYKES, T., 40 Cedar Road, Fenham, chemist. (C.C.J., 19/4/41). £11 4s. 5d. January 30.

Declarations of Solvency Filed

COLLOID RUBBER CO., LTD., London, S.W.1. (D.S.F., 19/4/41). March 22.

METAL AND ELECTROCHEMICAL PRODUCTS, LTD., London, S.W.1. (D.S.F., 19/4/41). March 22.

Company News

Monsanto Chemicals, Ltd., announce a final ordinary dividend of 16⅔ per cent., tax free.

Bryant & May, Ltd., are paying a final ordinary dividend of 12½ per cent., making a total of 22½ per cent., tax free, for the year, gainst 25 per cent. for 1939.

William Blythe & Co., Ltd., announce a final dividend of 12 per cent. on ordinary shares (last year 7 per cent.), making a total distribution of 15 per cent. (10 per cent.).

Pinchin, Johnson & Co., Ltd., record a trading profit for 1940 of £330,347 (against £355,547). A final distribution of 6 per cent. is now announced, making a total ordinary dividend of 8½ per cent. (10 per cent.).

Imperial Chemical Industries, Ltd., announce that they have decided to recommend a final dividend on the ordinary stock of 5 per cent. actual which, with the interim of 3 per cent., makes 8 per cent. for the year (same as for 1939), less tax at the standard rate for 1941-42 (reduced by relief in respect of Dominion Income Tax at the rate of 3d. in the £). In 1939 approximately £2,500,000 was provided for National Defence Contribution and Excess Profits Tax. In 1940 the provision for these taxes amounted to approximately £5,660,000. After bearing the above increased war taxation, providing £2,000,000 for obsolescence and depreciation (the same as in 1939), and providing for the company's income tax, the net income for the year 1940 amounts to £6,418,533 as against £7,313,485 in 1939. The directors have appropriated £339,262 to the war contingency reserve and £180,092 (against £180,049) to the workers' pension fund. Provision for the dividend on the preference stock amounts to £1,666,104 and for the interim and final dividends on the ordinary stock to £4,032,149, leaving a balance of £200,926, which, added to £681,428 brought in, gives a total balance of £882,354 to be carried forward.

Chemical and Allied Stocks and Shares

THE stock and share markets have continued to be overshadowed by the war developments, and security values showed a reactionary trend in the absence of demand, although no heavy selling was reported. Investment buying of British Funds has also been on a smaller scale, but in this section the undertone appeared to be fairly steady. Prices of many industrial shares were not adequately tested by business, but the absence of heavy selling assisted sentiment, as this indicates confidence in the position and outlook and general willingness to be prepared if necessary to take a long view. Shares of companies playing an important part in the war effort were relatively steady, the assumption being that despite the high level of taxation, future dividends may be little changed, bearing in mind the continued expansion in war work.

In accordance with the general tendency on the Stock Exchange, Imperial Chemical ordinary units were slightly lower on balance, and are 29s. 3d. at the time of writing, while the preference units were easier at 33s. 3d. Nevertheless, the recently-issued preliminary figures for the past year's working created a favourable impression, and the 8 per cent. dividend, which is maintained, is again earned with a good margin. Dunlop Rubber were easier around 33s. awaiting the results, which are expected next month. Lever & Unilever were steady at 22s. 3d., and few movements were shown in the company's preference shares; while British Oil & Cake Mills preferred ordinary were firm at 37s. 9d. at which a good yield is offered on the basis of the 12½ per cent. dividend, which was shown to be well covered by the recently-issued results. Turner & Newall reacted to 67s., but British Oxygen had a fairly steady tendency around 63s. 9d. at which the yield is less than 5 per cent; the company is among those whose earnings seem likely to keep at a favourable level during the period of the war. United Glass Bottle were around 50s. and the yield in this case is also less than 5 per cent., but although the dividend was limited to 12 per cent. it was a very conservative payment, as nearly 21½ per cent. was earned on the ordinary shares last year. British Aluminium ordinary were steady at 39s. 6d. Pinchin Johnson, however, were lower at 17s. 6d. on the 8½ per cent. dividend total, which compares with 10 per cent. paid for 1939; no doubt taxation has borne heavily on earnings. Incidentally, in the case of Imperial Chemical, whose preliminary figures have been referred to above, E.P.T. and N.D.C. required £5,600,000, as compared with £2,500,000 in 1939. The units of the Distillers' Co. have been steadier at 61s. 9d., and United Molasses 6s. 8d. units were quoted at 22s. 9d. Elsewhere, Murex ordinary shares have been firm on the maintenance of the interim dividend at 7½ per cent.

In other directions, Associated Cement were easier on the chairman's statement indicating that recovery in profits is unlikely in the current year. At 50s. there is only a small yield on the basis of last year's 10 per cent. dividend, but the disposition is to regard the shares as a long-term holding, awaiting the large amount of building and reconstruction work after the war. Borax Consolidated deferred were steady at 28s. 9d. and Fison Packard were around 32s. Morgan Crucible 5½ per cent. preference transferred at 21s. 6d. at one time, and the 5 per cent. preference around 21s. Among other preference shares, those of W. J. Bush transferred at 92s. 6d. at one time, and Cellon 6 per cent. preference at 18s. 6d.

Among other securities, Boots Drug were 35s. 6d., Timothy Whites 18s. 6d., and Sangers 15s. 6d. William Blythe 3s. shares were around 5s., awaiting publication of the financial results. Imperial Smelting were again 10s. 6d. and General Refractories 8s. 4½d. Barry & Staines were 26s. 6d., awaiting the dividend announcement, and Nairn & Greenwich 52s. 6d. Elsewhere, oil shares were sensitive to the war news, more particularly Anglo-Iranian and Burmah Oil.

British Chemical Prices

Market Reports

A QUIET trade is reported from most departments of the general chemicals market and new bookings are on a smaller scale than for some weeks past. On the other hand, the movement into consumption of those chemicals essential to the war effort is well maintained, and ex-contract deliveries are proceeding along normal lines. Available supplies of bichromate of potash and caustic potash are finding a ready market, and the demand for yellow prussiate of potash is much in excess of the suply position. Nearly all the soda products are moving well with quoted rates unchanged, but firm. Prices for acetic, tartaric and citric acids are unaltered and values generally are steady at recent levels. A moderately good trade is being put through for the general run of tar products and values in this market are firm. There is a continued good demand for cresylic acid, both for home and export, and quotations display an upward tendency.

MANCHESTER.—Holiday conditions have, to some extent, been a factor on the Manchester chemical market during the past week so far as new bookings are concerned, these in most instances having been only moderate in the leading heavy products, although, on the whole, the quantities moving into consumption against contracts have been fairly satisfactory. Values generally remain on a firm basis. In the tar products section quotations generally are strong; there is a steady demand for crude tar, creosote oil, cresylic acid and most of the light materials.

GLASGOW.—The position in the Scottish heavy chemical trade is still unchanged. Business for home and export is keeping quiet with prices firm.

Price Changes

Sodium Sulphate (Salt Cake).—MANCHESTER: £4 13s. 6d. per ton, d/d station.

Vermilion.—Pale or deep, 13s. 8d. per lb., for 7 lb. lots and less. Plus 5 per cent. War Charge.